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Dr. Gotkin has developed several ways to use effectively games and mechanical devices to teach language skills to preschool and kindergarten children. The matrix game, a set of pictures in columns and rows, which functions on the principles and methods of programed instruction, requires the child to discriminate symbols, pictures, and colors and to verbalize his answer. The telephone interview is used to induce the individual child to structure conversations as the teacher gives him thematic prompts over the telephone. A third method uses the Language Master (a tape recorder and a moving card holder) to make the child verbalize after he has been aurally and visually stimulated. Also, it provides the child with immediate feedback. The alphabet board is a board grooved with the shape of the letters of the alphabet into which the letters are placed, much as in a puzzle. This device helps disadvantaged children, especially, to learn to discriminate the shapes and names of letters and to realize that letters are a code for the spoken language. All of these methods are designed for supplementary tools for teachers. (JS)

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MATRIX GAMES

Lassar G. Gotkin

Dr. Lassar Gotkin at the Institute for Developmental Studies has developed a number of effective ways of using games and mechanical devices to teach language skills. Three in particular are described in this paper: matrix games, the Language Master, the Alphabet Board.

A matrix consists of a set or sets of elements arranged in rows and columns. The elements are represented by pictures in each square. Each picture in a row or column contains an element shared by every other picture in that row or column. The child playing the game must discover the common element. Dr. Gotkin describes how the game might look in action.

A visitor to a classroom where a matrix game is being played would see five or six children sitting in front of a matrix board containing 16 pictures arranged in rows and columns of 4 pictures each. Examining the pictures reveals that in the first column, all of the children pictured are holding cookies; in the second, all are wearing gloves; in the third, all are drinking milk; and in the fourth, all are wearing hats. Scanning the pictures by rows reveals that each row has a common element: one boy, two boys, one girl, and two girls.

If the children had been playing the game for a few weeks, one of the children, playing the role of the teacher, might be heard saying to "her" class, "Close your eyes, no peeking." Then she would cover one of the pictures with an opaque magnetized rectangle. "Now open your eyes. Who

can tell me something about the picture that I covered?" To produce the answer, the child must be able to (1) scan the pictures vertically and horizontally, (2) abstract the common element of both the row and of the column of the hidden picture, (3) combine these two pieces of information, (4) produce the information in a sentence, and (5) explain in words how he figured it out. Underlying the solution are classificatory skills which some investigators find are more difficult for children from lower class backgrounds than for their middle class peers, especially when the contents are presented by pictorial representation.

Matrix games provide for objectives other than the complex cognitive abilities involved in solving the above problem. These objectives are: to speak clearly; to follow complex directions; to develop new vocabulary and concepts; and, most important, to be an independent learner. Being an independent learner can have many definitions. Here it is defined in terms of ability to take the teacher's role, which includes such skills and competencies as asking questions and monitoring one's own as well as other children's behavior.

The matrix illustrated below can be used to develop various syntactical structures. The first picture shows, "The boy is putting on his hat." The child or children in the pictures can be referred to as girl, girls, boy, boys, he, she, they, thus providing drill on pronouns. The verb form can be varied: "put on his hat," "is putting on her hat," "are putting on their hats," etc. That is, each picture in the matrix can be described by a kernel sentence and then transformed in drills needed to develop language fluency.

At the Institute, matrix games have been developed in accordance with principles of programmed instruction. That is, the games are based upon:

(a) Clearly specified instructional objectives. An example of such a statement of instructional objectives involves the problem presented above; given a matrix of pictures, the child will be able to figure out the content of a covered picture by abstracting the common vertical and horizontal element, state it so that the rest of the group can understand his answer, and explain how he arrived at the answer.

(b) Careful sequencing. The matrix games are sequenced in three ways:

1) There are twenty matrices sequenced to increase in complexity. The pictures in the illustrative matrix can be classified quite readily on the basis of information that is visually available. On the other hand, later matrices involve conceptual classification by function such as: animals, where the animals live, what they eat, and their special characteristics.

2) The requirements of the games played with each matrix increase in complexity. At the outset the games involve following simple directions such as "Put this circle on the two boys drinking milk." Later the game might involve directions like: "Put a red X on one girl putting on her hat," and "First, put on a blue circle on. . . and then put green X on . . ." Sequencing is done in the directions as well as in the cognitive elements.

3) The children's verbal responses similarly increase in complexity. From identifying the content of a picture with a label like "a fireman" the children describe their own actions in increasingly complex phraseology such as, "I put a red X on the boy walking the dog and a blue circle on the man riding the horse."

(c) Small steps. The child is given the opportunity to respond after only a small segment of information has been presented. The sequence of steps leading to the final objectives is designed to be easy enough to insure that learning will occur with few, if any, errors. A beginning step might involve merely placing a symbol on a picture of a man walking a dog. The response here involves processing a minimum amount of information and placing a symbol on the board.

(d) Individual active participation. While the matrix games are recommended as small group activity, each child does get many opportunities to respond, and even when the child is not responding himself, he must pay attention because he may be the next person called upon.

The overt responses of active participation are important in their contribution to learning. Moreover, they are valuable to the teacher in providing evidence of the child's grasp of the concepts. Each child's responses are themselves a record of his level of mastery, and can be used to move the child ahead or to provide more practice.

(e) Confirmation. In most of the matrix games, confirmation is provided by the teacher. In principle, learners seldom need be told they are wrong. For example:

Teacher: What did you do, Johnny?

Johnny: I put it on the man.

Teacher: There is a man in the picture. Johnny, what's the man doing? . . . (If the child doesn't say, then). . . "Is he walking the dog or riding the horse?"

Johnny: Riding the horse.

Teacher: That's right. . . the man is riding the horse. . . Let's all say that. . . the man is riding the horse. . . What's this symbol? . . . (Often the child will provide the answer. If not, then) . . . Is it an X or a circle?

Johnny: A circle.

Teacher: And what color is the circle?

Johnny: Blue.

Teacher: A blue circle, good. You put a blue circle on the man riding the horse. Johnny, tell me what you did.

Such teaching procedures elicit the answers by providing prompts; at the end the teacher models the correct sentence form and has the child repeat it.

Procedures for correcting partially correct answers emphasize to the child and his classmates the correct elements of his response before focusing on the error.

Teacher: I want someone to put a blue circle on the boy who is drinking milk . . . Charles.

(Instead of a blue circle, Charles puts a blue X on the correct picture.)

Teacher: (Taking the blue X off the picture and pointing to the the picture) Who is in the picture?

Charles: A boy drinking milk.

Teacher: That's right. The boy is drinking milk. And, what color is this?

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Charles: Blue.

Teacher: Good. And, what do we call this?

Charles: An X.

Teacher: Right. And, what is this? (Holding up a circle).

Charles: A circle.

By following these procedures the teacher has learned that Charles does know all of the elements of the directions. Charles' error at this point in the sequence is most common. It would seem that the issue involves the amount of information in the directions, not its content. Notice the teacher has been able to find this out without having to tell the child he has been wrong.

It is important that the children learn to assess the adequacy of their own and others' responses. The teacher may make various types of errors so that part of the "game" is to locate her mistakes. Two types of errors that the children enjoy the most involve absurdities like "Put this X on the horse riding the man" and "Put the red X on the man riding the elephant" when no elephant is present. Needless to say, catching and correcting the teacher's errors adds to the children's involvement in the games.

THE TELEPHONE INTERVIEW AS A TEACHING TECHNIQUE

Although it is not unusual to find a toy telephone among the furnishings of an early childhood classroom, there has been little systematic use of the telephone as a teaching aid. At the Institute for Developmental Studies,

a telephone was first used for research purposes to elicit more spontaneous verbalizations than would be forthcoming in face-to-face contact with an adult. However, in classrooms where telephones were introduced, there appeared to be a substantial improvement in language development. This suggested the possibility of using the telephone interview as a teaching tool as well as research tool. Guidelines were prepared to help teachers make full use of the telephone as an innovative teaching device, and a standardized interview developed.

Guidelines for Using Telephones in Classroom

A. Introduction to the telephone (Children should be divided into two groups, with each group to go to the school office where a telephone is available.)

1) Show a real phone and a toy phone and explain differences between them: that the other speaker's voice cannot be heard on a toy phone, and that a real phone cannot be carried around.

2) Explain the parts of a real phone and how to use it: the necessity for listening to what the voice on the other end is saying and for holding the receiver (demonstrate) and speaking directly into the mouthpiece.

B. Initial exposure to the telephone

If possible, have the assistant who is with one group of children dial a number to call the teacher who is with the other group. Then allow each child to have a turn speaking for a few minutes with the teacher. Have the assistant teacher assist at the phone with the child to see that he is using it properly. Have the children line up to say a few words over the phone ("Hello," "How are you?" "Goodbye") and then the teacher should instruct the child, over the phone, to pass the phone on to the next child.

On subsequent days during work-and-play period or while children are working independently in the room, telephone interviews might be arranged. The assistant teacher can call children individually to come and talk with the teacher on the telephone. The teacher should question the child about the activities he was engaged in that morning. She should use probes that will encourage child to elaborate on his response rather than to be able to answer a simple "yes" or "no." Or the teacher can ask the child what he would like to talk about. She should allow the child to structure the conversation as much as possible by leaving probes and comments open-ended. e.g. "Tell me more about them." "What else happened?" If the child fails to suggest a topic after some encouragement by the teacher, she should suggest a topic. She might say, "Tell me about the time we visited the firehouse," and then let the child draw upon his own recollections as much as possible. In suggesting a topic, she should select one which is broad enough to permit a sequence of speech from the child, not just one-word comments.

Other possibilities for eliciting conversation are:

1) Have an object on the chair beside the phone. Question the child about what he sees:

What is it?
What does it look like?
What color is it?
What shape is it?
What size is it?
How big is it?
What does it sound like?
What is it made of?
What can you do with it?
What does it feel like?
Is it hard or soft?

2. Have a book on the chair beside the phone. Ask the child to open the book to the first page and then, turning one page at a time, tell the story to the teacher over the phone. Use neutral probes such as, "Tell me more about that picture" and "And then what happens?" to encourage more speech from the child. Have the child proceed with the story as far as time will permit.

3. During a morning when the teacher has read a story to the class, call the children individually to the phone. Ask them to tell about the story that was read that day. Begin by saying: "You remember that story I read today. Tell me about it." If there is no response, say: "You remember, it was about. . .(brief description of story theme). Now tell me what happened."

4. The teacher might suggest to two children involved in the same type of activity that they talk to one another on the phone about what they are doing. She should observe the children's conversation and, if needed, make suggestions to give directions to the conversation.

LANGUAGE MASTER

The Language Master is a machine like a tape recorder into which one may record his own voice and play it back. It is very similar to a two-track recorder used in foreign language laboratories, on which one may record a standard on the instructor's track and then, record the student's voice on the other track for comparison to the standard. It differs from a tape recorder in that it also has a device for inserting cards and pushing

them through. The cards can show pictures or printed words or both. The child presses the operating bar to feed the card through the machine. At the same time as he sees the card pass through the machine, a recorded voice says, "This is a picture of a _____." The child pushes the record bar and says, "This is a picture of a horse." Then he can press the bar and listen to the recorded voice saying, "This is a picture of a horse. Did you say 'horse'?" The child can then check back on what he did say.

The beginning use of the Language Master with the pre-kindergarten would entail only listening to the voice and seeing the picture pass through the machine. At first, it is very difficult for the fours to master the manipulation of the machine and simultaneously elicit a verbal and recorded response. The teacher can introduce recording procedure to the children once first steps have been mastered.

At the Institute the Language Master is used in all three kindergarten classes toward the end of the year to teach reading (mostly phonics), mathematics (number, order, etc.). In the first grade, the teachers have prepared formal programs in reading (including remedial reading), mathematics, concept formation, and language. In all of the second grades, Language Master cards are used consistently to teach reading skills.

The Language Master has several valuable features. It provides a way of practicing previously learned skills that appeals to a child because he hears his own voice. It is simple enough for him, at least in primary grades, to operate alone so the teacher has more time for activities that can't be programed for a machine. And it is very adaptable. A card can

be illustrated and recorded in a matter of minutes, in response to an immediate classroom need. Accordingly, teachers really tend to make use of it.

Some possible uses of the Language Master in pre-kindergarten and primary classes follow.

1. Labels of classroom equipment. Show pictures of objects in the classroom using both singulars and plurals.

2. Class names for transportation, foods, community helpers, animals, shape, color.

3. Directions entailing action verbs and prepositions. Directions can be practiced with the teacher first, before the child is introduced to them on the machine. Directions might include: "Walk to the window;" "Pick up the book on the table;" "Walk across the room to the sink;" "Sit in front of Susan;" "Give me the block between the boxes;" "Go from the table to the sink;" "Find me the block on the shelf;" "Go out the door and come in again."

4. Adjectives. Adjectives of texture and taste can be introduced after a sensorimotor experience with appropriate materials.

5. Other possibilities for use: phonics training; auditory discrimination--for example, various sounds with pictures of the musical instruments making each sound.

THE USE OF AN ALPHABET BOARD TO TEACH THE ALPHABET

Lassar Gotkin and Fairfid Candle

For three or more decades the whole-word method of teaching has dominated the instructional scene. As part of this method, teachers have

been instructed to avoid teaching the individual letters of the alphabet. For most children of middle class backgrounds, the instruction worked no hardship, since many of these children know the alphabet before entering kindergarten, and teaching the alphabet to them is unnecessary.

On the other hand, many children from lower class backgrounds often enter kindergarten with no notion of what the alphabet is about. In one Harlem school, for example, it was found that two-thirds of the children knew no letters of the alphabet upon entering kindergarten, while in a suburban community, 40 percent of the children could pick out the letters when they were named by an adult. The differences between middle class and lower class children are not limited to the ability to recognize alphabet letters by name, however. Research at the Institute for Developmental Studies has indicated that some of the difficulties in learning to name alphabet letters can be attributed to problems in visually discriminating the sounds which go with the letters. The alphabet is a complex symbol system, and its mastery requires the coordination of a variety of visual and auditory skills. For example, for a child to learn the letter "M," he must, on the one hand, be able to discriminate it <u>visually</u> from among similarly shaped letters such as "W." On the other hand, he must be able to discriminate the sound of the letter name from the names of other letters which have similar sounds, such as "N." Furthermore, he must be able to attach the sound which he hears to the shape which he sees. And, finally, he must grasp the concept that letters are simply a means of "coding" our spoken language into a written one, and vice versa. A child who experiences difficulty in these discrimination

skills is almost certain to experience difficulty in learning to read.

Our research with the alphabet has been part of a larger research program dealing with discrimination skills underlying learning. In the process of formulating methods to provide children from disadvantaged backgrounds with perceptual skills relevant for beginning reading, an alphabet form board was developed at the Institute for Developmental Studies for the purpose of introducing the alphabet as a sensorimotor experience, rather than as an abstract symbol system. In some ways, the alphabet board is similar to a puzzle. The puzzle pieces consist of wooden letters, and the child places these wooden letters into individual letter-shaped slots. The wooden letters are three inches high, and each letter slot can contain two identical letters, placed one on top of the other. The surface of the alphabet board measures 19 x 27 inches; the board can be propped up at an angle.

In designing the alphabet board for four- and five-year-old children, it was felt that the type of experience which could be provided by the alphabet board would serve to familiarize a child with the shapes of alphabet letters, without requiring the child to cope simutaneously with sounds of letters. Furthermore, this familiarization could occur at an earlier age than is possible in formal reading instruction. Later on, when formal reading instruction was begun, presumably a child who had mastered the perceptual problems of visual discrimination using three-dimensional solid letters would find it easier to do the same thing when the letters were printed in two-dimensional form.

A second reason for giving early experience with solid letters, rather than the two-dimensional letters, is that solid letters used in a manipulative task provides the child with a richer experience than that which can be had with two-dimensional letters. By a "richer" experience is meant an experience in which the child can make use of more than one sense modality, touch as well as vision.

A third reason for the design of the alphabet board as a task in which letters, in addition to merely being handled, are placed inside letter-shaped slots, is that such a task provides the child with corrective "feedback," that is, with information about the correctness of his actions. With very few exceptions, each letter can be placed only in its own letter slot, and only when the letter is oriented correctly. It was anticipated that this corrective feature of the alphabet board would help the child to learn to pay attention to the details of shape which differentiate letters of the alphabet, such as the "tail" of the "Q," and the lack of one with the "O." To be sure, there are particular letters with which this type of differentiation is much more difficult, such as the rather insignificant differences in the shapes of "M" and "W," and for letters such as these, tasks using the alphabet board are better structured so that the emphasis is on orientation rather than shape.

The existence of such perceptual difficulties becomes apparent when watching a letter-naive child playing with the board. It is common for such children to pick up the "B," for example, and to attempt to force it into the "B" slot in a reversed position, a graphic demonstration of a reversal error. Another type of error which illustrates perceptual problems occurs when the

child takes an "O" and actually attempts to put it into the "D" slot. In the beginning, the children sometimes seem to feel that if they push hard enough, they can make the letter conform to the shape of the slot, which suggests that the children are trying to solve the problem in a primitive way and are not making use of the relevant visual and tactile feedback. The relevance of instruction becomes apparent when, with increased experience, children begin to scan the board visually and are able to select the correct slot immediately, thereby relinquishing the more primitive trial-and-error behaviors.

Teachers have made use of the alphabet board in a variety of ways, and its use has been carefully integrated with other classroom routines. The primary principle that we have followed is to provide a learning tool that will enable children to work independently, thus relieving the teacher of the need for constand supervision. After initial instruction, children can use the equipment individually or in pairs, unsupervised by the teacher, thereby freeing the teacher for other tasks.